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Do legal origins affect cross-country incarceration rates?

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ABSTRACT

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Prison populations vary tremendously across countries. This paper investigates the potential relationship between incarceration rates and legal origins in a large cross-section of countries. We argue that legal origins alter the relative costs associated with imprisonment as a means for social control. Using panel data from 2001 to 2011, we find countries with civil legal origins have lower prison populations. Our empirical results are highly robust after controlling for crime rates, criminal justice resources, economic factors, political institutions, and social factors. In addition, our results do not appear to be driven by the variation in criminalized activities. To explain these results, we conjecture that imprisonment is a lower cost mechanism for enforcing social order in common law countries. In civil law countries, bureaucratic infrastructures allow for methods such as day-fines, community service, seizure of property, and probation as more affordable alternatives to imprisonment. *Journal of Comparative Economics* **43** (3) (2015) 595–612. The Political Theory Project, Brown University, United States; Mississippi State University, United States.

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1. Introduction

> "*The chief means of coercion at the disposal of government is punishment. Under the rule of law, government can infringe a person's protected private sphere only as punishment for breaking an announced rule.*"
>
> [F.A. Hayek (1960, p. 206)]

Controlling crime is crucial for the maintenance of social order. Punishment by imprisonment is a standard method of criminal sanctioning to enforce government laws in virtually every nation; however, the scale of its usage varies greatly. For example, as of 2011, the United States imprisons approximately 715 per 100,000 citizens, the second highest rate in the world. The majority of countries hold less than 150 inmates per 100,000 citizens. Burkina Faso hosts the fewest (30 per 100,000) followed by Japan and Cyprus (55 per 100,000).

Casual observation of the data suggests that countries with similar levels of imprisonment range across levels of income, growth rates, geographic conditions, and regions (Mauer, 1995; Newman, 1999; Walmsley, 1999–2011, 2003). What can explain the pattern of incarceration across countries? If a society fosters more violence and crime, a larger prison population

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might be expected. Also, if a legal system criminalizes more behaviors, greater imprisonment will likely result. In addition, law enforcement may be more effective at catching criminals in certain countries. As such, a nation's legal institutions may provide insight into how incarceration is used to control social disorder differently across countries.

Legal origins represent how a nation's legal processes are organized based on different historical experiences, specifically whether a nation was founded or colonized by English common law or French, German, or Scandinavian civil law. Starting with La Porta et al. (1997, 1998) an extensive body of work illustrates that common law countries harbor financial and economic institutions more conducive to property rights, capital accumulation, trade, the freedom of contract, and foreign investment (see: Acemoglu et al., 2001; Glaeser and Shleifer, 2002; La Porta et al., 2008 for thorough surveys). Collectively, these findings suggest that common law nations have less hierarchical regulations and more market-oriented processes of social control relative to civil law.

Legal origins also relate to social outcomes beyond the financial and economic realm such as military conscription (Mulligan and Shleifer, 2005a) and government ownership of media (Djankov et al., 2003a). Additional works show correlation with legal origins and the extent of regulation effecting start-up firms, labor markets, and doing business more generally (Djankov et al., 2002; Botero et al., 2004; Mulligan and Shleifer, 2005b), as well as the organizational features of government courts and judicial checks and balances (Djankov et al., 2003b, 2008; La Porta et al., 2004).

In this paper, we aim to explain how legal origins may shape outcomes for criminal punishment, specifically the use of incarceration. To do so, we collect incarceration rates for a large cross section of countries from 2001 to 2011. Our investigation shows that countries with lower prison populations have civil legal origins. A country colonized by English common law as opposed to French, German, or Scandinavian civil law appears to host more imprisonment per capita. Specifically, civil law is associated with smaller prison populations ranging from approximately 144 (French), 109 (German), and 185 (Scandinavian) fewer inmates per 100,000 citizens than common law.[1] This result remains highly robust after controlling for crime rates, criminal justice resources, economic factors, political institutions, and social factors. In addition, our results do not appear to be driven by the variation in criminalizing different activities such as drugs. Our findings hold when we examine the incarceration of total prisoners and non-drug related prisoners.

At first our findings seem at odds with the body of work surrounding legal origins. Common law countries have less regulated economic, financial, and social outcomes compared to civil law. For example, La Porta et al. (2008) write, "[i]n all these spheres [currently researched], civil law is associated with a heavier hand of government ownership and regulation than common law (286)." However, in our study it is civil law that hosts less governmental incarceration. To explain this apparent contradiction, we conjecture that imprisonment is likely a lower cost way for deterring crime, punishing lawbreakers, and controlling social disorder in common law countries; whereas civil law countries rely more affordably on bureaucratic methods such as day-fines, community service, seizure of property, loss of driving rights, psychiatric treatment, drug rehabilitation, and probation.[2]

The basis for this argument can be found in Djankov et al. (2003c) where they model the institutional possibilities of a country as an optimization of social order. The costs of private disorder are weighed against dictatorship given a nation's unique social circumstance. "[Private] [d]isorder refers to the risk to individuals and their property of private expropriation in such forms as banditry, murder, theft, violation of agreements, torts, or monopoly pricing (p. 598)." Furthermore, Glaeser and Shleifer (2002, p. 1196) write, "[p]eople demand a dictatorship when they fear a dictator less than they fear each other (Olson, 1993; Grossman, 2002)." In reaction to their respective levels of private disorder a country's government can implement "market discipline, private legal action through courts, public enforcement through regulation, and state ownership (Djankov et al., 2003c, p. 598)," with each representing a marginal increase in state power and greater reliance on government institutions.[3]

Within this model, legal origins represent alternative frameworks for responding to private disorder. Glaeser and Shleifer (2002) suggest the early, more-peaceable social climate of England allowed greater reliance on private adjudication mechanisms as opposed to the hierarchical controls needed to fend off greater disorder amidst the French revolution. As early as the twelfth and thirteenth centuries, France aimed to bureaucratically unify and control its territory. England was more decentralized and relied upon competitive lay judges and trials by jury (Dawson, 1960; Berman, 1983; Damaska, 1986). Hence, the civil legal tradition tends to have more centrally enforced and formally defined legal rules regarding financial and economic procedures than common law. La Porta et al. (2008, pp. 305–6) emphasize how different legal origin histories created unique opportunities and consequences for legal adaptations and subsequent policy trends.[4]

Given the greater prominence of bureaucratic institutions throughout civil law countries, alternative forms of punishment enforced through bureaucracies may substitute for imprisonment. This includes day-fines, community service, seizure of property, loss of driving rights, psychiatric treatment, drug rehabilitation, and probation. In civil law countries, these

[1] Calculations are based on the average coefficients in Table 3.

[2] This perspective complements a variety of theoretical and empirical accounts for cross national prison populations highlighting the inverse relationship between social welfare spending and incarceration. See: Beckett and Western (2001), Garland (2001), Lacey (2008, 2012), Harcourt (2011), Cavadino and Dignan (2006a, 2006b).

[3] Leeson (2008a, 2008b, 2009) argue self-enforcing exchange is more durable than commonly recognized and at least possible in some larger heterogeneous cases.

[4] The distinctive criminal legal sphere of the common law developed relatively late in legal history between the sixteenth and nineteenth centuries with a greater role of government authority therein compared to economic and financial spheres (Berman 1983, 2001, pp. 306–29).

Table 1
Legal origins, crime and incarceration.

Dependent variables	Panel A: Crime rates			Panel B: Criminal justice		Panel C: Criminal enforcement				
	Theft	Homicide	Drugs	Police	Judges	Prosecuted	Convicted	Convict. Rate	Drug Convict. Rate	Prison Pop.
French	−175.76*	−2.03*	−89.79***	26.35	8.75***	−494.96*	−1405.94***	−0.12	−32.30**	−143.46***
	(97.765)	(1.205)	(19.154)	(21.016)	(0.848)	(259.567)	(312.654)	(0.724)	(15.902)	(25.435)
German	−66.32	−5.74***	−60.74**	−42.47*	18.99***	−591.33**	−1576.11***	−1.56*	−32.35*	−133.84***
	(88.307)	(0.938)	(23.203)	(22.320)	(1.279)	(272.008)	(306.673)	(0.793)	(17.049)	(25.073)
Scan.	1523.49***	−4.88***	259.78***	−191.24***	8.07***	863.04	−483.31	−1.12	30.32	−233.51***
	(207.802)	(0.899)	(44.303)	(23.680)	(0.603)	(574.716)	(398.832)	(1.071)	(33.318)	(22.957)
Log gdp pc	489.65***	−3.62***	58.50***	53.99***	3.04***	429.79***	171.86***	−0.46	16.79***	−13.85*
	(41.859)	(0.457)	(7.157)	(7.819)	(0.474)	(73.233)	(49.188)	(0.613)	(3.730)	(7.308)
Constant	−3672.64***	44.59***	−396.93***	−189.07**	−25.28***	−2575.60***	526.05	6.87	−104.90**	445.80***
	(393.718)	(4.860)	(61.764)	(70.322)	(4.814)	(601.690)	(546.394)	(5.808)	(43.485)	(81.014)
Observ.	677	665	392	596	523	505	522	406	60	760
Overall R^2	0.38	0.15	0.45	0.11	0.33	0.11	0.15	0.01	0.33	0.12

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

alternative penalties are, on the margin, more affordable and can be more easily monitored and publically administered than under the common law.[5] Although, incarceration represents a relatively formalized technique of legal punishment, it may carry higher perceived benefits and lower marginal costs under common compared to civil law (Djankov et al., 2008, p. 437). In other words, different organizational structures across legal origins shape the relative costs and benefits of incarceration. Without extensive bureaucracies already in place, common law territories opt for more severe and codified penalties via imprisonment over civil law countries.

The observed relationship between common law and prison populations might be explained by multiple arguments. For example, economic performance could drive the level of incarceration. Higher incomes may foster incentives for criminal behavior through inequality or social disruption (Rusche and Kirchheimer, 1939; Foucault, 1975; Wilkins, 1991; Wacquant, 1999, 2001; De Giorgi, 2006). Also, wealthier countries can afford to imprison criminals (Levitt, 1998; Kessler and Levitt, 1999). In contrast, a wealthier country can afford to develop rules and enforcement mechanisms to deter criminal activity reducing the need to incarcerate (Kleiman, 2009). In addition, the effectiveness of the court system determines the ease of both prosecution and conviction. This could affect both sentencing policies and the use of imprisonment.

To address these concerns, we present basic preliminary results examining the differences between civil and common law countries in crime rates, criminal justice resources, and criminal enforcement. We also examine the relationship between legal origins with drug offenses and drug conviction rates. This is done to minimize concerns that common law countries criminalize more activities thus driving higher incarceration. We present these results in Table 1 below. For each specification, we use a pooled OLS model and control for French, German, and Scandinavian legal origins as well as log GDP per capita.

In panel A, our dependent variables are types of crime rates. We use homicide rate (per 100,000), theft (per 100,000), and the number of drug offences (per 100,000). As illustrated in columns (1)–(3), there is no systematic evidence that, on average, civil law countries have lower crime rates. Homicide rates are significantly lower in civil law countries. Scandinavian countries have a strong positive association with theft and drug offences, while French countries have significantly lower thefts and drug offences. German countries have a negative and significant relationship with drug offences. Income per capita does not consistently predict crime. It is positively and significantly related to theft and drug offences but negatively related to homicide rates.

In Panel B, we measure criminal justice resources with the number of judges (per 100,000) and the number of police (per 100,000). German and Scandinavian countries have significantly fewer police. All civil law countries have significantly more judges, consistent with legal origins theory. Income per capita positively and significantly relates to both judges and police as wealthier countries can afford to hire more judges and police.

[5] The country reports for France (Borricand, 1993), Germany (Aronowitz, 1993), Sweden (Wikstrom and Dolmen, 1993), and Finland (Joutsen, 1993), compiled as part of the World Fact Book of Criminal Justice Systems (Newman et al., 2002), list the following as alternative penalties to imprisonment: fines, seizure of property, closing down of establishments, and community service (France), day-fines based upon the offender's income, instruction, declaration of guilt without imposition, community service and probation (Germany), psychiatric treatment, probation, community service, treatment within the social services, and fines (Sweden), day-fines and community service (Finland).

Lastly, in Panel C, we proxy for criminal punishment by the number prosecuted per 100,000, convicted per 100,000, the conviction rate (measured as conviction per prosecution), the drug conviction rate, and our main variable of interest, the incarceration rate per 100,000. An interesting result emerges—civil legal origins are not consistently related to any other criminal enforcement measure but incarceration. French and German countries prosecute and convict significantly less individuals. Only German countries have significantly lower overall conviction rates, while both French and German countries have fewer drug convictions.[6] The last column shows that all three civil legal origins are negatively and significantly correlated with prison population rates. French legal nations have smaller prison populations by approximately 143 inmates (per 100,000), German by about 133 (per 100,000), and Scandinavian by approximately 233 (per 100,000). Income per capita is negative and significant.

Collectively, these results provide support for our core thesis that common law countries rely on incarceration more than civil law countries for reasons other than differences in crime, criminal justice resources, and the ability to prosecute or convict criminals. In fact, there are no systematic differences between the convictions of criminals across civil law countries. The only significant difference is the manner in which criminals are punished. We provide additional support for this relationship in the empirical section below.

Investigations of the potential relationships between diverse legal institutions and prison outcomes are limited (see: Cavadino and Dignan, 2006a, pp. 3–30; Brodeur, 2007; Lacey, 2008, pp. 3–55; 2012 for thorough surveys).[7] We narrow this gap by drawing from the legal origins literature. First, we offer theoretical insight arguing that the alternative frameworks for reacting to social disorder represented by legal origins shape the costs and benefits of incarceration. Second, we trace the influence of legal origins beyond the financial and economic spheres. Given that imprisonment is a primary means of criminal punishment and regulatory compliance around the world, recognizing the institutional sources of different incarceration rates may be central to understanding how legal origins and historical experiences shape institutions more generally.

2. Empirical strategy and data description

We implement pooled OLS[8] analysis on an unbalanced panel from 2001 to 2011 using 113 countries, as data is not available for most countries across every year.[9] This is a common issue when analyzing cross-country data (Acemoglu et al., 2001, 2002; Soares, 2004a, 2004b; La Porta et al., 2008).[10] We use pooled OLS over random effects given its simplicity and straightforward assumptions. However, we rerun all regressions presented in the following tables below using a random effects model. These results can be found in the online Appendix. The results are unchanged.

Due to the limited nature of the data, we recognize potential reverse causality and endogeneity; therefore, we emphasize the difficulty in claiming strong causal inferences. We seek to provide preliminary explanation for our observations consistent with previous works surrounding legal origins.[11] Appendix A provides a detailed list of all variables including data and source information. Appendix B lists all countries included in the analysis. We briefly summarize our variables below.

To measure incarceration rates (our dependent variable), we rely on the United Nations Office on Drug and Crime (UNODC) Survey on Crime Trends and the Operations of Criminal Justice Systems.[12] Prison population is measured as total persons held in penal institutions per 100,000 inhabitants.

A country's legal origin is measured by its respective tradition using dummy variables classified as English, German, French, or Scandinavian. The data is collected from La Porta et al. (2008). This most recent classification no longer distinguishes legal origins by socialist tradition. Instead, former socialist countries are reclassified as either German or French according to the main historical influence on their new legal system. For example, Russia is classified as having French legal

[6] We note that in the random effects model, as shown in the online Appendix Table 1, there is no significant relationship between any measure of civil law and conviction rates including drug crimes.

[7] In a sample of the 100 wealthiest nations using OLS techniques, Ruddell (2005) finds similar correlation between imprisonment and common legal origin, represented by Newman's (1999) dummy variables. Greenberg and West (2008) find correlation between common law (as measured by Mukherjee and Reichel 1999) and the death penalty. In an online working paper, Spamann (2008 unpublished) investigates the relationship between legal origins and prison populations. The sample includes 214 observations for a single year where his main correlation with legal origins is similar to ours.

[8] Standard errors are clustered by country.

[9] Prison population for a small subset of countries is available before 2001. However, we choose 2001 as our starting point due to the much larger number of countries that are included.

[10] Most studies analyzing international incarceration rates limit their analysis to advanced democracies or OECD countries. Sutton (2004) performs pooled regression from 15 nations over a 30-year period finding literate, developed, non-socialist but leftist democracies are less likely to have the death penalty.

[11] Some research contests the meaningfulness of the legal origins categories (Graff, 2008; Helland and Klick, 2011). Others question the exogenous nature of legal origins as colonial strategies differed across English common law and French civil traditions (Klerman et al., 2011; Dari-Mattiacci and Guerriero, 2011). Similarly, Spamann (2010) finds "no systematic difference in the complexity, formalism, duration, or cost of procedure in courts of first instance (149)." Guerriero (2011) argues legal origins are proxies for the weakness of democracy and cultural heterogeneity but agrees that institutional forms related to economic performance are slow changing and historically shaped. We do not believe these criticisms are of concern for our analysis as our investigation depends only upon the slow changing and historically embedded nature of institutional differences. In addition, legal origins seem relatively exogenous compared to contemporary penal policies and prison population outcomes regardless of colonial strategies.

[12] Objective national measures of crime and punishment for comparative purposes are difficult to obtain as various regimes criminalize different behaviors (Newman, 1999), sometimes produce unreliable reports (Soares, 2004a, 2004b), and use alternative punitive techniques (Reichel, 2002). Most researchers admit some incommensurability of prison rates as an indicator of general severity across legal regimes (Pease, 1992, 1994). China for example, executes a greater number for more menial violations than the United States. Despite such challenges, incarceration rates have proven useful and remain the best measures available of criminal punishment by detainment.

Table 2
Summary statistics.

Variable	Panel A: Panel summary statistics					Panel B: Mean by legal origins			
	Observ	Mean	Std Dev	Min	Max	English	French	German	Scan.
Prison Pop Rate	771	199.44	198.84	27.09	2901	281.95	158.50	180.11	63.93
English	771	0.25	0.43	0.00	1.00	1.00	0.00	0.00	0.00
French	771	0.46	0.50	0.00	1.00	0.00	1.00	0.00	0.00
German	771	0.23	0.42	0.00	1.00	0.00	0.00	1.00	0.00
Scan	771	0.07	0.25	0.00	1.00	0.00	0.00	0.00	1.00
Log GDP pc	760	9.63	1.03	6.53	11.75	9.38	9.23	9.77	10.67
Homicide	674	6.84	11.06	0.00	91.40	12.46	9.83	3.08	1.14
Theft	686	1095.5	1193.3	0.91	9295	973.49	644.68	1019.8	3007.3
Safe Alone	674	61.59	14.90	27.60	94.40	64.44	57.19	60.96	78.11
Assaulted	676	5.58	4.12	1.00	28.00	6.60	7.46	3.65	3.19
Property Stolen	676	13.28	6.06	3.20	43.00	15.63	14.11	11.54	11.44
Judges	525	14.42	11.70	0.19	59.59	5.92	11.53	21.46	15.17
Police	601	322.59	180.10	10.70	17656	347.26	341.13	314.70	196.79
Drugs	398	138.88	187.09	0.12	891.74	133.41	67.51	108.39	490.42
Growth	771	3.74	4.62	−17.96	34.50	2.85	4.54	4.08	1.85
Unemp	763	8.59	5.45	0.40	37.30	9.00	8.90	9.81	5.40
Male LF Part.	771	72.35	7.82	44.90	95.30	76.53	74.65	66.83	71.13
EFW	666	7.15	0.89	2.88	9.07	7.09	6.79	7.20	7.73
Urban	771	0.66	0.20	0.10	1.00	0.55	0.64	0.65	0.85
Arms imports	545	16.07	40.79	0.00	522.79	35.29	7.40	7.84	29.12
Polity2	719	6.62	5.37	−10.00	10.00	4.33	4.55	7.25	10.00
Voice	711	0.79	0.20	0.00	1.00	0.72	0.69	0.84	0.99
Political Stab.	711	0.76	0.09	0.46	0.98	0.72	0.74	0.77	0.83
Rule of Law	711	0.70	0.21	0.08	1.00	0.66	0.61	0.73	1.00
Corruption	711	0.51	0.22	0.00	1.00	0.48	0.41	0.47	0.90
Communism	616	0.18	0.29	0.00	0.83	0.00	0.16	0.45	0.00
Jud. Indepd.	324	0.81	0.26	0.00	1.00	0.94	0.65	0.78	1.00
Death Penalty	643	0.36	0.48	0.00	1.00	0.68	0.38	0.24	0.00
Protestant	637	14.51	26.24	0.00	97.80	12.26	1.52	13.08	90.22
Catholic	637	37.76	38.74	0.00	97.30	21.88	47.12	31.71	0.62
Education	683	103.46	7.58	67.66	139.16	104.88	104.50	102.84	99.79
Ethnic Frac	637	0.34	0.23	0.00	0.93	0.43	0.41	0.32	0.08
Lang. Frac	628	0.31	0.23	0.00	0.92	0.44	0.32	0.30	0.12
Relig. Frac	637	0.40	0.23	0.00	0.86	0.49	0.31	0.52	0.22
Trust	586	27.86	13.81	6.90	63.77	30.24	20.71	26.54	56.35
Prefer Prison	292	32.93	16.52	10.00	76.00	48.28	33.99	30.96	20.14
Nondrug Prison Rate	410	134.15	105.88	25.74	562.27	167.15	132.77	159.51	49.01
Drug Prison Rate	410	35.00	62.75	4.01	402.91	69.51	31.09	15.72	14.93
Drug Prison Ratio	410	0.19	0.12	0.02	0.58	0.22	0.21	0.11	0.24
GDP per capita	760	23,057	19,649	688	126,818	22,203	18,021	20,660	43,880

origin. Of the 24 former socialist countries in our sample, 11 have French and 13 have German origin. The empirical model specifications include French, German, and Scandinavian legal origins omitting English legal origin (Djankov et al., 2008; La Porta et al., 2008).

In addition to legal origins, all specifications control for income per capita measured by log gross domestic product per capita (PPP, constant 2011 international dollar) collected from World Development Indicators (2014).

We control for actual crime rates, including theft and homicide, as more crime could relate to higher incarceration rates. We also include the number of drug offences. All crime variables are collected from UNODC statistics and measured per 100,000 persons. In addition, we include three measures from Gallup WorldPoll to capture perceptions of crime. First, we include the percentage of respondents who feel safe walking alone. The second captures those who have personally had, or have a household member who has had, money or property stolen in the past twelve months. We also include the percentage of individuals reported being assaulted or mugged in the past twelve months. Lastly, we include two criminal justice measures, the number of police and the number of judges, per 100,000 (also collected from UNODC).

We also include a variety of economic and political variables to minimize omitted variable bias. Standard economic controls include economic growth, unemployment rates, male labor force participation, percent urban population, and arms imports (collected from World Development Indicators, 2014). We include a measure of economic freedom to control for economic institutions (Gwartney et al., 2013).

Next, we introduce a variety of measures to capture the quality and type of political institutions. Four measures come from the Worldwide Governance Indicators (2013) including voice and accountability, political stability, rule of law, and control of corruption. We also include a variable that captures a country's history with communism (Barro and McCleary, 2003). Lastly, judicial independence is included (La Porta et al., 2004).

In order to provide an overview of the dataset and differences among legal traditions, we present summary statistics and the mean value of each variable by legal origin in Table 2. We include 34 common law countries, 54 French, 19 German, and 5 Scandinavian legal origin countries.

Over the entire sample, the average incarceration rate is approximately 199 per 100,000 with a standard deviation of 199 per 100,000 highlighting the wide variation. As highlighted in Panel B, the average prison population in common law countries is approximately 282—over 50 percent higher than any of the civil law country averages (French 159, German 180, and Scandinavian 64).

The average GDP per capita is $23,057 with a standard deviation of about $19,649. Scandinavian countries record the highest incomes per capita of $43,880. Common law countries record the next highest with average incomes close to the mean ($22,203). German countries have an average income per capita of $20,660. French countries record the lowest with $18,021 average income per capita.

3. Empirical results

3.1. Benchmark results

Table 3 presents benchmark regressions examining cross country incarceration rates and legal origins. We control for legal origins, log gdp per capita, crime rates, and criminal justice measures. We include controls separately as well as simultaneously.

French, German, and Scandinavian civil legal origins are negative and highly significant. Column (1) reports the benchmark specification provided in Table 1 for comparison purposes. Column (2) includes homicide rates and theft to capture both violent and property crime. Homicide is positively and significantly related to incarceration; theft is positive but not significant. For example, a one standard deviation increase in homicide rates (about 11 per 100,000) increases the number of prisoners by about 60 (per 100,000). Legal origins remain negative and significant after controlling for crime.[13]

Next, we include two measures of criminal justice resources, the number of judges and the number of police. The results are shown in column (3); both are positive but only police is significant at the 10% level. A one standard deviation increase in police increases incarceration by about 28 inmates (per 100,000). Homicide remains significant and theft is now positive and significant. Legal origins remain significant.

In column (4), we switch from measuring crime rates collected from UNOCD to crime collected from Gallup World Poll (2012) survey data, including feeling safe walking alone, if someone had property stolen, or if an individual had been assaulted. All three enter negatively in the regression, but only feeling safe walking alone and assaulted is significant. For example, a one standard deviation increase in feeling safe walking alone is associated with about 65 (per 100,000) fewer prisoners. Most importantly, all three measures of legal origins remain negative and significant but with lower coefficients.

In column (5), we include all measures of crime as well as judges and police. French, German, and Scandinavian legal origins remain negative and highly significant with fewer inmates (per 100,000) ranging from 132 (German) to 163 (French) to 192 (Scandinavian).

Lastly, in column (6), we include the number of drug offences to proxy for differences in criminalizing behaviors. The criminality of drugs is common across most countries, yet drug enforcement varies tremendously with countries like the United States declaring a 'war on drugs.' Few others like Portugal have significantly relaxed enforcements against a variety of substances (Loo et al., 2002; Hughes and Stevens, 2010). The results show German legal origin loses significance with this inclusion. French and Scandinavian countries still host lower prison populations, 109 and 99 per 100,000, respectively. Drug offences are not significant. The number of observations drops significantly making it difficult to compare the results. We further examine the criminalization of drugs and incarceration in a later section.

The *R*-squareds vary based on the specification with the highest coming from the last specification controlling for drug crimes (0.43) and the lowest when only controlling for legal origins (0.12).

3.2. Economic controls

Next, we examine the robustness of legal origins by incorporating the relationship between economic outcomes and incarceration rates. We introduce a wide range of economic controls including economic growth, economic freedom, unemployment rate, male labor force participation, percent urban population, and arms imports.

Previous theoretical literature suggests a relationship between economic institutions, outcomes and prison populations. For example, business cycle volatility may negatively relate to prison populations as worsening economic conditions incentivize crime (Rusche and Kirchheimer, 1939; Cavadino and Dignan, 2006a, 2006b); however, the empirical results are ambiguous (Neapolitan, 2001; Sutton, 2000, 2004; Ruddell, 2005). In addition to log GDP per capita, we also include the annual economic growth rate to incorporate this argument. In addition, we also examine the role of economic freedom as it is

[13] To show the parallel nature of cross sectional OLS results we offer this brief summary: civil law origins were associated with smaller prison populations ranging from approximately 124 (French), 108 (German) and 182 (Scandinavian) fewer inmates per 100,000 citizens than common law nations. These results are available upon request.

Table 3
Incarceration and legal institutions benchmark model.

	Dependent variable: Prison population per 100,000					
	(1)	(2)	(3)	(4)	(5)	(6)
French	−143.46***	−157.62***	−203.96***	−94.42***	−163.63***	−109.09**
	(25.435)	(29.384)	(31.928)	(21.869)	(30.836)	(38.586)
German	−133.84***	−115.68***	−151.62***	−97.79***	−132.34***	−30.10
	(25.073)	(27.274)	(33.808)	(21.374)	(34.592)	(36.261)
Scan.	−233.51***	−234.95***	−217.37***	−136.95***	−192.00***	−99.82***
	(22.957)	(31.906)	(33.829)	(20.297)	(34.236)	(22.466)
Log gdp pc	−13.85*	−18.59	−74.73***	−4.43	−35.95**	−93.36***
	(7.308)	(13.008)	(17.713)	(8.187)	(17.855)	(22.342)
Homicide		5.44***	2.48***		2.74**	1.26
		(1.117)	(0.732)		(0.982)	(0.972)
Theft		0.01	0.01**		0.00	0.01*
		(0.008)	(0.006)		(0.004)	(0.004)
Judges			−0.67		−0.18	−1.38**
			(0.523)		(0.586)	(0.681)
Police			0.16*		−0.10	0.03
			(0.090)		(0.060)	(0.061)
Safe Alone				−4.35***	−3.03**	
				(0.529)	(0.924)	
Assaulted				−7.59**	−8.18**	
				(2.575)	(4.107)	
Property Stolen				−0.21	3.19	
				(1.800)	(2.193)	
Drugs						−0.01
						(0.035)
Constant	445.80***	452.98**	1019.93***	614.91***	879.07***	1155.19***
	(81.014)	(138.462)	(176.776)	(92.682)	(166.400)	(245.803)
Observ.	760	617	415	663	395	224
Overall R^2	0.12	0.21	0.34	0.19	0.34	0.43

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

documented that economically free countries experience higher economic growth, less violent crime, and better reporting of crimes (Easton and Walker, 1997; Gwartney et al., 1999; Mahoney, 2001; Soares, 2004a, 2004b; Stringham and Levendis, 2010).

Labor market conditions may also relate to incarceration rates (Western and Beckett, 1999; Western and Pettit, 2000) but previous literature is inconclusive on this relationship. Intuitively, it makes economic sense that imprisonment is positively related to unemployment (Chiricos and Delone, 1992) and negatively related with higher employment (Marvel and Moody, 1994). However, Sutton (2004) finds (surprisingly) high labor force participation positively and significantly impacts incarceration rates. As such, we include two measures related to employment, the unemployment rate and male labor force participation. Unemployment refers to the share of the labor force that is without work but available for and seeking employment. Labor force participation rate is the proportion of the male population ages 15–64 that is economically active.

Urban population may relate to crime as higher concentrations of more diverse populations represent a greater opportunity for private disorder and the organization of criminal networks (Glaeser, 1999); therefore, we include the percentage of the population living in an urban area. The availability of handguns and firearms via imports may also relate to crime, though precisely how is unclear. Higher quantities make guns more available for criminals but also more accessible for self-defense (Lott and Mustard, 1997). We include arms imports to control for these effects.

Table 4 above introduces the economic controls. In all seven regressions, French, German, and Scandinavian legal origins negatively and significantly relate to incarceration rates. Based on the average of all specifications, both French and German legal origins lower incarceration by about 116 inmates per 100,000. Scandinavian legal origin has almost twice the impact reducing the number of prisoners by approximately 205 per 100,000, slightly higher than the mean of incarceration.

The only economic controls that are significant relate to employment. The unemployment rate is positive and significant while male labor force participation rate is positive and significant.[14] Overall, these results suggest that legal origins hold a more robust relationship to incarceration than economic institutions or outcomes. In addition, the *R*-squareds are almost identical when only controlling for legal origins (see Table 3 above).

[14] In the random effects model shown in the online Appendix Table 3, all economic controls are insignificant.

Table 4
Incarceration and Legal Institutions with Economic Controls.

	Dependent variable: Prison population per 100,000						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
French	−145.19***	−98.38***	−147.83***	−104.09***	−142.86***	−80.24***	−98.87***
	(25.300)	(18.086)	(25.000)	(19.093)	(24.553)	(21.546)	(21.165)
German	−134.76***	−94.05***	−147.88***	−130.32***	−133.68***	−78.34***	−114.19***
	(24.971)	(18.882)	(24.053)	(19.357)	(24.790)	(23.206)	(24.521)
Scan.	−232.34***	−192.19***	−232.42***	−208.21***	−232.88***	−166.77***	−177.37***
	(23.187)	(17.802)	(23.040)	(18.885)	(22.367)	(22.215)	(23.472)
Log gdp pc	−13.06*	−5.80	−11.75	3.72	−12.83	−2.53	2.37
	(7.342)	(6.688)	(7.265)	(11.508)	(8.838)	(8.612)	(13.553)
Growth	1.53						1.18
	(1.189)						(1.592)
Unemp.		2.12**					4.67**
		(0.901)					(1.430)
Male LF Part.			−2.56**				−2.09**
			(0.836)				(0.971)
EFW				−11.73			1.86
				(10.450)			(9.687)
Urban					−6.84		45.24
					(44.952)		(57.440)
Arms						−0.05	−0.10
						(0.114)	(0.132)
Constant	433.43***	306.80***	632.81***	323.87***	440.08***	265.13**	311.55**
	(82.037)	(70.697)	(87.924)	(82.968)	(79.770)	(81.834)	(122.838)
Observ.	760	752	760	655	760	534	494
Overall R^2	0.12	0.12	0.13	0.14	0.12	0.09	0.14

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

3.3. Political controls

Next, we examine how political institutions relate to incarceration by including a variety of measures to proxy for the quality and type of political institutions. We include a broad measure of democracy, voice and accountability. This measure captures the extent to which a country's citizens are able to participate in selecting their government, the level of military involvement in politics, the freedom of expression and association, and a free media. Given previous findings, democracy may act as a constraint on forms of dictatorial power (Mulligan et al., 2004) perhaps including incarceration. However, public opinion also shapes democratic outcomes implying that if the public desires more severity, democracy will foster punitivity and thus correlate with higher incarceration (Scheingold, 1984; Pratt, 2007; Enns, 2014).

In addition, we include measures of political stability, rule of law, and control of corruption. Political instability could create opportunities and incentives for crime. In addition, political dissent is more likely criminalized in unstable regimes. The rule of law may impact incarceration as a weak rule of law could imply a high rate of false or frivolous imprisonment. Previous research demonstrates a consistent relationship between the extent of legal formalism within civil law contexts and the level of corruption (Shleifer and Vishny, 1993). As such, it seems reasonable for incarceration to be more leveraged by corrupt regimes.

We also include a country's history with communism, measured by average number of years under communism from 1925 to 2000 (Barro and McCleary, 2003). Under communism the scope of "dictatorship" was radically expanded, "in which all economic policy is a tool used to maintain the political control by the Communist party (Kornai, 1992; Djankov et al., 2003c, p. 604)." As such, communist governments required enforcement techniques beyond the capacities of bureaucratic infrastructures often resulting in totalitarian methods. Communism's legacy had lasting influence on the efficacies of transition (Treisman and Shleifer, 2005); thus it is not surprising for enforcement trends such as incarceration to persist.

Lastly, judicial independence is included as it is arguably the cornerstone of common law, thus capturing the beneficial flexibility of legal rules.

In Table 5 below, we present the robustness of legal origins with the inclusion of political institutions. In all regressions, legal origins retain their respective sign and significance. For example, in column (1), with the inclusion of voice and accountability, French legal origin reduces the prison population rate by about 98 inmates (per 100,000), German legal origin hosts 89 fewer inmates (per 100,000), and Scandinavian legal origin incarcerates 186 fewer inmates (per 100,000). Voice is positive but not significant. In all regressions, rule of law significantly reduces the rate of incarceration. A one standard deviation

Table 5
Incarceration and legal institutions with political controls.

	Dependent variable: Prison population per 100,000								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
French	−98.06***	−99.20***	−107.02***	−108.61***	−114.58***	−72.29***	−78.56***	−159.33***	−112.51***
	(19.131)	(19.136)	(18.365)	(18.972)	(19.142)	(18.191)	(17.222)	(27.733)	(22.567)
German	−89.03***	−94.61***	−91.86***	−104.77***	−104.23***	−142.72***	−135.93***	−235.10***	−220.48***
	(20.718)	(19.620)	(18.929)	(19.547)	(21.171)	(22.307)	(21.048)	(27.907)	(26.675)
Scan.	−186.82***	−195.82***	−162.19***	−152.76***	−147.78***	−181.17***	−145.98***	−198.92***	−191.80***
	(19.630)	(19.010)	(17.921)	(20.110)	(20.181)	(21.558)	(19.544)	(26.845)	(25.842)
Log gdp pc	−4.05	−10.03	12.20	11.13	16.76*	31.22***	70.34***	54.26**	78.89***
	(8.974)	(7.632)	(7.901)	(8.323)	(8.797)	(6.415)	(10.066)	(16.695)	(14.985)
Voice	−50.17				11.63		−179.66***	126.18*	−72.50
	(38.495)				(42.376)		(37.237)	(73.554)	(48.864)
Political Stab.		32.92			94.50		106.56**	68.16	107.25
		(68.675)			(67.240)		(53.022)	(65.340)	(66.475)
Rule of Law			−179.12***		−142.28***		−137.61***	−406.53***	−305.06***
			(29.164)		(33.559)		(34.149)	(64.202)	(56.821)
Corruption				−163.04***	−111.98**		−26.37	11.31	77.46
				(37.404)	(43.746)		(38.792)	(59.732)	(48.596)
Communism						238.89***	223.64***		257.02**
						(22.579)	(24.540)		(121.947)
Jud. Indep.								32.77	5.40
								(27.445)	(28.342)
Constant	344.42***	340.03***	275.90***	246.13**	187.44**	−86.94	−287.62***	−132.84	−371.58**
	(78.893)	(82.698)	(73.450)	(76.544)	(79.610)	(54.060)	(66.155)	(138.117)	(114.555)
Observ.	700	700	700	700	700	609	587	321	310
Overall R^2	0.12	0.12	0.15	0.14	0.15	0.25	0.31	0.29	0.33

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

increase in rule of law decreases the number of inmates, on average, by approximately 49 per 100,000. Controlling corruption is negative and significant in two of the five regressions.[15]

In column (6), we introduce a measure of how long a country was under communist rule. Legal origins remain negative and significant; however the coefficient on French legal origin is reduced by this inclusion. The measure of communism is positive and highly significant. Comparing a country that never experienced communism, for example, Japan, to a country under the longest communist rule, e.g. Russia, incarceration rates are larger under communism by about 239 inmates (per 100,000).[16] A one standard deviation increase in the length of communism (the difference between Germany and Poland's experience) increases the prison population rate by about 69 inmates (per 100,000).

In column (7), we include voice, political stability, rule of law, control of corruption, and communism. Legal origins and communism retain their respective signs and significance with similarly sized coefficients. In column (9), we introduce judicial independence. It is not significant. In column (10), we include all measures of political controls. Legal origins remain significant.

Collectively, these results suggest that, on average, French, German, and Scandinavian legal origins host lower prison population rates by approximately 105, 134, and 173, per 100,000, respectively. In addition, nations experiencing a long history of communism have greater prison populations by about 239 inmates per 100,000. By including communism, the adjusted R-squareds increase from 0.12 to 0.25.

In Table 6, we include both economic and political controls for robustness. For comparison purposes, column (1) is a benchmark replication from a regression in Table 2 controlling for legal origins, log GDP per capita, homicide, theft, judges, and police. In column (2), we include all benchmark controls as well as all economic controls. Legal origin remains negative and significant. In column (3), we add the main political controls with a similar finding. Lastly, in column (4), we include the benchmark economic and political controls now including communism. We find similar results.

4. Sensitivity tests

To provide additional support for our results, we include two robustness checks controlling for additional variables and an alternative measure of incarceration—non-drug prisoners. Our results hold. French, German, and Scandinavian legal traditions remain negative and significant.

[15] This significance goes away in the random effects model presented in the online Appendix.
[16] Countries that have the longest experience with communism are Russia, Ukraine, Armenia, Azerbaijan, Belize, Georgia, and Kyrgyz Republic.

Table 6
Incarceration and Legal Institutions with Economic and Political Controls.

	Dependent variable: Prison population per 100,000			
	(1)	(2)	(3)	(4)
French	−203.96***	−169.01***	−143.94***	−112.98***
	(31.928)	(35.946)	(32.992)	(29.169)
German	−151.62***	−145.87***	−140.88***	−191.74***
	(33.808)	(42.557)	(38.831)	(35.331)
Scan.	−217.37***	−216.79***	−162.32***	−200.54***
	(33.829)	(42.249)	(35.678)	(33.146)
Log gdp pc	−74.73***	−1.77	42.95	109.52***
	(17.713)	(26.941)	(31.629)	(27.513)
Homicide	2.48***	3.45**	2.58*	4.85***
	(0.732)	(1.254)	(1.475)	(1.190)
Theft	0.01**	−0.00	0.01	0.00
	(0.006)	(0.005)	(0.005)	(0.005)
Judges	−0.67	−0.76	−0.14	1.05
	(0.523)	(0.671)	(0.711)	(0.689)
Police	0.16*	0.02	−0.12	−0.19**
	(0.090)	(0.092)	(0.091)	(0.078)
Growth		0.07	−0.91	−0.71
		(1.934)	(1.756)	(1.279)
Unemp.		1.49	3.23	2.71
		(2.209)	(2.139)	(1.652)
Male LF Part.		−6.38***	−6.67***	−1.35
		(1.313)	(1.563)	(1.281)
EFW		11.59	57.69***	26.01*
		(13.468)	(15.784)	(14.230)
Urban		77.97	26.12	26.29
		(70.507)	(74.902)	(67.000)
Arms		−0.32	−0.83**	−0.91**
		(0.249)	(0.308)	(0.293)
Voice			−400.59***	−498.97***
			(106.098)	(101.043)
Political Stab.			−84.00	13.19
			(89.377)	(80.802)
Rule of Law			122.10	187.28**
			(91.288)	(77.496)
Corruption			−253.55**	−145.43*
			(85.159)	(82.064)
Communism				286.04***
				(30.102)
Constant	1019.93***	673.18**	416.72	−571.73**
	(176.776)	(236.467)	(308.875)	(214.112)
Observ.	415	300	299	284
Overall R^2	0.34	0.27	0.36	0.48

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

4.1. Social controls

The first robustness check introduces a variety of social controls including the death penalty, religion, education, social heterogeneity, civic capital, and severity for criminal punishment.

First, we include a proxy for public opinion regarding harshness toward criminal penalties. This includes a death penalty dummy variable equal to 1 if a country has the death penalty in law (regardless of actual use); equal to 0 otherwise. This is collected from Amnesty International (2014). Previous literature suggests incarceration and the death penalty correlate as both reflect public preferences for punitivity (Mukherjee and Reichel, 1999; Ruddell, 2005; Greenberg and West, 2008; Spamann, 2008 unpublished). In addition, we include a proxy for preferences toward punishment. This variable comes from the International Crime Victims Survey (ICVS) (van Dijk et al., 2007) capturing the public's punishment preferences measured as a percentage of the public preferring imprisonment instead of community service for recidivist burglary.

We include a measure for the percentage of the population that is Protestant or Catholic. It is argued that religion impacts the level of government intervention (La Porta et al., 1999) and that theological doctrine significantly shapes penal philosophy through history (Berman, 1983, 2001). We also measure education as a percent of the population enrolled in primary education (World Development Indicators, 2014) as the positive externalities of education likely include deterrent effects upon crime (Everingham and Rydell, 1994; Tauchen et al., 1994; Usher, 1997). Measures of ethnic, linguistic and religious

Table 7
Incarceration and Legal Institutions with Social-Economic Controls.

	Dependent variable: Prison population per 100,000						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
French	−116.44***	−91.14***	−101.17**	−123.64***	−60.73**	−115.41***	−146.01***
	(28.394)	(23.410)	(31.166)	(31.912)	(25.579)	(28.650)	(34.945)
German	−174.25***	−184.81***	−205.12***	−184.53***	−162.37***	−171.45***	−190.32***
	(33.296)	(29.277)	(37.965)	(38.498)	(30.550)	(33.692)	(34.257)
Scan.	−209.16***	−170.41***	−341.80***	−221.43***	−126.07***	−220.12***	−186.47***
	(33.948)	(26.059)	(66.965)	(39.891)	(27.375)	(40.757)	(29.274)
Log gdp pc	56.24***	46.16***	43.55***	55.34***	55.57***	56.65***	221.25***
	(12.544)	(11.406)	(10.766)	(16.247)	(14.035)	(12.691)	(51.340)
Homicide	5.34***	3.86***	4.28***	5.25***	3.58**	5.07***	8.64***
	(0.564)	(0.571)	(0.488)	(0.641)	(1.195)	(0.539)	(2.007)
Theft	0.00	0.01**	−0.00	−0.00	−0.00	0.00	−0.01**
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Judges	−1.04**	−0.46	−1.37**	−1.26**	−1.80***	−1.16**	0.91
	(0.477)	(0.560)	(0.515)	(0.535)	(0.507)	(0.493)	(0.674)
Police	−0.06	−0.03	−0.03	−0.09	−0.04	−0.05	0.17**
	(0.057)	(0.042)	(0.051)	(0.066)	(0.050)	(0.055)	(0.080)
Communism	319.22***	398.89***	352.21***	321.15***	307.65***	337.25***	433.60***
	(30.234)	(24.566)	(31.473)	(33.401)	(35.945)	(29.958)	(56.790)
Death Penalty		159.12***					
		(20.219)					
Protestant			1.85**				
			(0.591)				
Catholic			0.01				
			(0.151)				
Education				−0.83			
				(1.140)			
Ethnic Frac					177.19**		
					(62.229)		
Language Frac					−76.53*		
					(41.879)		
Religion Frac					139.20**		
					(44.189)		
Trust						0.79	
						(0.699)	
Prefer Prison							2.97***
							(0.856)
Constant	−310.50**	−290.38**	−194.85*	−190.22	−398.43**	−346.35**	−2196.25***
	(121.016)	(109.158)	(111.324)	(145.854)	(145.609)	(127.715)	(546.255)
Observ.	367	339	339	342	331	348	195
Overall R^2	0.42	0.59	0.47	0.43	0.48	0.42	0.53

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

fractionalization are also included to capture social heterogeneity (Alesina et al., 2003). As civic capital inversely relates to private disorder (Djankov et al., 2003c), we include survey data for levels of generalized trust (World Values Survey 2000, 2005) measured as the percentage of respondents who answered 'most people can be trusted' (The European Values Study Foundation and World Values Survey Association, 2006).

In Table 7, we report the results. In column (1), we replicate our benchmark specification including communism for comparison. The relationship between legal origins and incarceration is not sensitive to these additional variables, as all three measures of civil law remain negative and significant. The average effect across these specifications suggests a lower prison population rate by 107, 181, and 210, per 100,000, by French, German, and Scandinavian legal origin, respectively.

Column (2) shows that a country having a death penalty incarcerates approximately 159 additional inmates (per 100,000). Protestant religion is positively and significantly related to incarceration. All three measures of fractionalization are significant. Ethnic and religion fractionalization are both positive while language fractionalization is negative. Lastly, a preference for prison sentencing is significantly related to incarceration with a one standard deviation increase leading to about 49 additional inmates per 100,000.[17] In addition, the adjusted R-squareds suggest minimal explanatory power from these additional controls.

[17] These social controls are no longer significant in the random effects model in Appendix Table 6.

Table 8
Non-Drug Related Incarceration and Legal Institutions.

	Dependent variable: Non-drug related prison population per 100,000				
	(1)	(2)	(3)	(4)	(5)
French	−58.00***	−68.26***	−53.74***	−44.78**	−28.50
	(14.145)	(12.153)	(15.979)	(19.463)	(17.996)
German	−107.91***	−103.86***	−76.09***	−115.97***	−100.27***
	(16.121)	(14.331)	(20.926)	(21.186)	(17.935)
Scan.	−113.05***	−115.42***	−110.17***	−109.04***	−100.05***
	(12.110)	(10.843)	(15.660)	(18.896)	(18.103)
Log gdp pc	22.14**	32.14***	47.27***	38.38*	38.82**
	(8.418)	(8.923)	(12.981)	(19.603)	(16.767)
Communism	279.42***	287.71***	333.83***	378.45***	342.15***
	(28.111)	(25.160)	(35.391)	(35.009)	(28.410)
Homicide		5.05***	4.89***	4.16***	4.00***
		(0.747)	(0.787)	(0.790)	(1.115)
Theft		0.01**	0.01**	−0.00	0.00
		(0.002)	(0.003)	(0.002)	(0.003)
Judges			−2.10***	−1.31**	−0.43
			(0.573)	(0.458)	(0.651)
Police			−0.04	0.02	−0.00
			(0.059)	(0.054)	(0.059)
Growth				−0.04	−0.97
				(0.933)	(0.879)
Unemp.				1.14	0.01
				(1.273)	(1.344)
Male LF Part.				−1.47	−2.85*
				(1.373)	(1.461)
EFW				17.20	36.24**
				(13.352)	(15.355)
Urban				270.27***	149.76**
				(64.851)	(51.182)
Arms				−0.20*	−0.40**
				(0.104)	(0.131)
Voice					−326.95***
					(52.500)
Political Stab.					−96.91
					(59.806)
Rule of Law					150.51**
					(58.637)
Corruption					12.76
					(51.020)
Constant	−73.19	−201.56**	−326.73**	−468.28**	−185.07
	(89.927)	(92.875)	(142.051)	(184.831)	(185.626)
Observ.	392	356	275	222	222
Overall R^2	0.45	0.53	0.59	0.62	0.69

Notes: Pooled OLS model with robust clustered (by country) standard errors in parentheses.
See Appendix A for all variable description.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

4.2. Drug incarceration

As discussed earlier, our results may be sensitive to common law countries criminalizing more activities than civil law countries with particular influence from drug prohibition. For example, it is estimated that half of Federal inmates in the United States from 2001 to 2013 are in prison due to drug charges (Carson, 2014, p. 17). Thus, investigating total versus non-drug prison populations provides an opportunity to minimize concern over stricter criminalization in common law countries.

We retest our main specifications on non-drug related prison populations (per 100,000). To calculate this measure, we combine two different data sources. We use our prison population data from UNODC and the drug prison population ratio from Bewley-Taylor et al. (2009). Drug prison population ratio is only available for one point in time.[18] The authors calculate

[18] Drug related incarceration includes drug offenders, combining both 'possession and use' and 'trafficker and dealing' figures. This data is only available for 54 countries.

this measure with data as close to 2008 as possible. We create a measure of non-drug related prison populations across countries and years by assuming the ratio of drug prisoners is constant over time. This assumption allows for an increase in drug prison population but at the same rate as the increase in the overall prison population.

We first calculate the drug prison population by using the ratio of drug prisoners (held constant) multiplied by the prison population rate from UNODC for each year from 2001 to 2011. Non-drug related prison population is calculated by subtracting drug prison population from total prison population from UNODC.

The results are present in Table 8 above. We first present a stripped down benchmark specification controlling for legal origin, log GDP per capita, and communism. As we found previously with total prison population rates, legal origin is negatively and significantly related to non-drug related prison population. For example, French, German, and Scandinavian legal origins reduce non-drug related inmates by about 58, 107, and 113, per 100,000, respectively. Communism increases non-drug related inmates by about 279 per 100,000.

This relationship holds throughout the specifications as we introduce additional controls including crime rates, criminal justice measures, economic, and political controls. The adjusted *R*-squareds suggest these specifications, on average, explain over half of the variation in non-drug related incarceration rates. As an additional robustness check (not reported), we replace the dependent variable with drug prison population rate and find similar results. Collectively, these findings mitigate much of the concern that the unique criminality of drugs explains the relationship between incarceration and legal origin.

These results support our main argument. In so far as drug crimes are perceived as a threat to social order, monitoring, regulation, and sanctioning by public bureaucracies under civil law represent a smaller increase in marginal enforcement costs when compared to reliance on imprisonment. However, with prison facilities in place, common law countries face lower marginal costs of additional imprisonment compared to bureaucratic enforcement techniques. Collectively, this suggests that common law countries tend to rely upon incarceration for enforcement against criminal behaviors and social controls more so than civil law nations.

After running several additional robustness tests including rerunning all specifications on a cross section of the data, using a random effect model, and dropping two observations that were detected as outliers, the results hold.[19] In addition, we use a measure for property rights instead of economic freedom, additional public opinion variables on crime and safety, and a measure of executive constraints for political institutions. These variables are insignificant and our main findings are unchanged. The random effects specifications are reported in the online Appendix. The additional sensitivity tests are not reported to save space but they are available upon request.

5. Conclusions

In previous work, legal origins are argued to shape contemporary economic performance indirectly through historical legacies of good governance (La Porta et al., 1999). Our findings suggest that it also shapes incentives to more systematically rely upon incarceration. Historical processes within civil legal territories, while less effective at promoting economic prosperity, create bureaucratic means of enforcement that can be utilized at lower marginal costs than punishment by imprisonment. This logic supports the conjecture that alternative frameworks for responding to disorder and maintaining social control within legal origins relate to incarceration outcomes. Thus, we consider our findings to support the literature showing that legal origins shape not only financial and economic consequences but other social institutional outcomes as well.

Our findings do not carry normative or optimality implications. Such assessments require knowledge outside the scope of our analysis. For example, we would need to know the deterrent effects as well as the full scope of financial and social costs of incarceration relative to bureaucratic monitoring. Our study offers an explanation for why greater prison populations in common law countries may be contextually efficient, but it lacks the ability to claim common law incarceration rates as either socially optimal or excessive. In addition, our analysis suggests a perhaps sober realization regarding prison reform as legal origins represent deeply ingrained incentive structures pertaining to social control.

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[19] The outlier observations are St. Vincent and the Grenadines in 2004 and 2005. The methodology used in the bacon test using a percentile of 0.25 in Stata as suggested by Weber (2010).

Appendix A. Data description

Abbreviation	Description	Source
Prison Pop	Total number of adult inhabitants in prisons, penal or correctional institutions (excluding temporary jail lock-ups) per 100,000. "Prisons, penal or correctional institutions" means all publicly and privately financed institutions where persons are deprived of their liberty	UN Office on Drug and Crime
French	Dummy variable coded 0 or 1: 1 indicates that a country was colonized by France and French legal code was transferred; 0 indicates that a country inherited English, German, or Scandanavian	La Porta et al. (2008)
German	Dummy variable coded 0 or 1: 1 indicates that a country was colonized by Germany and German legal code was transferred; 0 indicates that a country inherited French, English, or Scandanavian	La Porta et al. (2008)
Scandinavian	Dummy variable coded 0 or 1: 1 indicates that a country was colonized by Scandinavian countries and Scandinavian legal code was transferred; 0 indicates that a country inherited French, German, or English	La Porta et al. (2008)
Log GDP PC	Log of gross domestic product per capita, PPP, constant 2011 international dollar	World Development Indicators 2014
Homicide	Homicides per 100,000. Intentional homicide is defined as unlawful death purposefully inflicted on a person by another person	UN Office on Drug and Crime
Theft	Number of police recorded thefts per 100,000 at the national level. Theft means depriving a person or organization of property without force with the intent to keep it. Excludes burglary; housebreaking; robbery; and theft of a motor vehicle, which are recorded separately	UN Office on Drug and Crime
Judges	Total number of professional judges/magistrates per 100,000. Professional Judges or Magistrates means both full-time and part-time officials authorized to hear civil, criminal and other cases, including in appeal courts, and to make dispositions in a court of law. Also includes authorized associate judges and magistrates	UN Office on Drug and Crime
Police	Total police personnel per 100,000. Police Personnel means personnel in public agencies whose principal functions are the prevention, detection and investigation of crime and the apprehension of alleged offenders	UN Office on Drug and Crime
Prosecuted	Total number of persons prosecuted per 100,000. This refers to alleged offenders against whom prosecution commenced in the reporting year. Persons may be prosecuted by the public prosecutor or the law enforcement agency responsible for prosecution, at the national level, irrespective of the case-ending decision	UN Office on Drug and Crime
Convicted	Total number of persons convicted per 100,000. This refers to persons found guilty by any legal body authorized to pronounce a conviction under national criminal law, whether or not the conviction was later upheld. The total number of persons convicted should also include persons convicted of serious special law offences but exclude persons convicted of minor road traffic offences and other petty offences	UN Office on Drug and Crime
Conviction Rate	Total number convicted/total number prosecuted	UN Office on Drug and Crime
Drug Conviction Rate	Total number convicted/total number prosecuted, for all drug offenses	UN Office on Drug and Crime
Safe Alone	Measured as a percentage of respondents answering 'yes' to the question: Do you feel safe walking alone at night in the city or area where you live? Averaged 2006–2010	Gallup WorldPoll
Assaulted	Measured as a percentage of respondents answering 'yes' to the question: Within the past 12 months, have you been assaulted or mugged? Averaged 2006–2010	Gallup WorldPoll

(*continued on next page*)

Appendix A. (*continued*)

Abbreviation	Description	Source
Property Stolen	Measured as a percentage of respondents answering 'yes' to the question: Within the past 12 months, have you had money or property stolen from you or another household member? Averaged 2006–2010	Gallup WorldPoll
Drugs	Total drug offenses per 100,000 is all intentional acts that involve the cultivation, production, manufacture, extraction, preparation, offering for sale, distribution, purchase, sale, delivery on any terms, brokerage, dispatch, dispatch in transit, transport, importation, exportation, and possession or trafficking of internationally controlled drugs	UN Office on Drug and Crime
Growth	Growth of GDP per capita, PPP, constant 2011 international dollars	World Development Indicators 2014
Unemp.	Unemployment refers to the share of the labor force that is without work but available for and seeking employment	World Development Indicators 2014
Male LF Part.	Labor force participation rate is the proportion of the male population ages 15–64 that is economically active: all people who supply labor for the production of goods and services	World Development Indicators 2014
EFW	Economic freedom is measured on a scale from zero to ten, with ten representing a greater degree of freedom. The index is captures size of government, monetary policy and price stability, legal structure and security of private ownership, freedom to trade with foreigners, and regulation of credit, business, and labor	Gwartney et al. (2013)
Urban	Percent of population living in an urban area	World Development Indicators 2014
Arms	Arms imports is the supply of military weapons through sales, aid, gifts, and those made through manufacturing licenses	World Development Indicators 2014
Voice	Voice and accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Captures the level of military involvement in politics and democratic accountability	Worldwide Governance Indicators (2013)
Political Stab.	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism	Worldwide Governance Indicators (2013)
Rule of Law	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	Worldwide Governance Indicators (2013)
Corruption	Measures control of corruption using multiple sources. Captures the assessment of the intrusiveness of the country's bureaucracy	Worldwide Governance Indicators (2013)
Communism	Measures a history of communism. The average of dummy variables equal to 1 for whether a country is communist at six points during the 20th century, every 15 years starting in 1925. We average all six dummies to get a measure of the share of the century a country was communist	Barro and McCleary (2003)
Jud. Indep.	Judicial Independence is computed as the sum of three variables: the tenure of Supreme Court judges (highest court in any country), the tenure of highest ranked judges ruling on administrative cases, and the existence of a case law. The variable is normalized from zero to one where higher values equal a higher degree of judicial independence. This variable is measured as of 1995	La Porta et al. (2004)
Death Penalty	Death Penalty coded 0 or 1: 1 indicates the country has the death penalty in law, 0 suggests otherwise. As of March 2014	Amnesty International
Protestant	Measured as the percentage of population in 1980 (or for 1990–1995 for countries formed more recently) that belonged to Protestant religion	La Porta et al. (1999)

(*continued on next page*)

Appendix A. (*continued*)

Abbreviation	Description	Source
Catholic	Measured as the percentage of population in 1980 (or for 1990–1995 for countries formed more recently) that belonged to Roman Catholic religion	La Porta et al. (1999)
Education	Percentage enrolled in primary education. Can exceed 100% due to inclusion of over- and under-aged students	World Development 2014
Ethnic Frac	Measures the degree of ethnic heterogeneity	Alesina et al. (2003)
Language Frac	Measures the degree of language heterogeneity	Alesina et al. (2003)
Religion Frac	Measures the degree of religious heterogeneity	Alesina et al. (2003)
Trust	Trust is the percentage of respondents who answered that "Most people can be trusted. Average from 1982 to 2007	World Values Survey 1981–2007
Prefer Prison	Percentage of the public opting for imprisonment as punishment for recidivist burglar in 2004/05 plus results from earlier surveys in countries and main cities. Average results from 2001 to 2005 were used	van Dijk et al. (2007)
Non-drug Related Prison Population	Drug prison population is calculated by using the ratio of drug prisoners (held constant) multiplied by the prison population rate from UNODC for each year from 2001 to 2011. Non-drug related prison population is calculated by subtracting drug prison population from total prison population from UNODC	Bewley-Taylor et al. (2009)

Appendix B. List of countries

All countries, 113 total			
Albania	Czech Republic	Kuwait	Romania
Algeria	Denmark	Kyrgyz Republic	Russia
Argentina	Dominican Republic	Latvia	Saudi Arabia
Armenia	Ecuador	Lebanon	Senegal
Australia	Egypt	Lesotho	Sierra Leone
Austria	El Salvador	Luxembourg	Singapore
Azerbaijan	Estonia	Macedonia	Slovak Republic
Bahamas	Finland	Malta	Slovenia
Bahrain	France	Mauritius	South Africa
Bangladesh	Georgia	Mexico	Spain
Barbados	Germany	Moldova	Sri Lanka
Belarus	Greece	Mongolia	St. Vincent & Grenadines
Belgium	Guinea	Morocco	Swaziland
Belize	Guyana	Mozambique	Sweden
Bolivia	Honduras	Myanmar	Switzerland
Bosnia and Herz.	Hong Kong	Nepal	Syrian Arab Republic
Botswana	Hungary	Netherlands	Thailand
Brazil	Iceland	New Zealand	Trinidad and Tobago
Bulgaria	India	Nicaragua	Turkey
Burkina Faso	Ireland	Norway	Turkmenistan
Burundi	Israel	Oman	Uganda
Canada	Italy	Panama	Ukraine
Chile	Jamaica	Paraguay	UAE
China	Japan	Peru	United Kingdom
Colombia	Jordan	Philippines	United States
Costa Rica	Kazakhstan	Poland	Uruguay
Croatia	Kenya	Portugal	Venezuela
Cyprus	Korea, Rep.	Qatar	Yemen
			Zimbabwe

Appendix C. Supplementary material

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jce.2014.11.002.

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